

# **Lego Physics - Simple and Powered Machines**

Tuesday, 9:00-10:30

Instructors: Rachel Ameche and Jenni Buchanan

Who doesn't love building with legos? Students will explore, experiment, build, and create using Legos to understand science concepts of simple and powered machines. Students will build an understanding of how gears, pulleys, levers, axles, cams, wheels, motor power, and wind power work. They'll explore each science concept by building an example, do an experiment or test, build different working examples using builder plans in cooperative groups, and then solve a problem with their own invention. This class will have notes, hands-on STEAM work, reading, and a lot of problem solving. Students will have some independent work due weekly focusing on the weekly topic.

**Week 1:** Gears: What are gears? How can they transfer force or even change the direction of a force? Where can we see gears? Difference between a drive gear and a driven gear and how do they work together and relate to speed? Build and test gears for speed. Create a gear powered fan. What is an idle gear and what does it do? Build your own mechanism.

**Week 2:** Pulleys: What is a pulley? What does it have to do with load and work? Where do you see pulleys and use them in everyday life? What is the difference between a single pulley and a double pulley? Build a crane and test different loads. Build your own mechanism.

**Week 3:** Levers: What is a lever? How does it work? How does it relate to force? What is the difference between first-class, second-class, and third class levers? Build and try the 3 different types of levers. What do you notice? Where do we use levers in our everyday life? Build your own grabbers and test them. Build your own mechanism.

**Week 4:** Axles: What are they? How do they work? How does it relate to steering? Where do we use axles in our everyday life? What is a fixed axle and what is a split axle? Build your own steering car that cleans up messes. Build your own mechanism.

**Week 5:** Wind Power: How does it work? What is mechanical advantage? How many blades do you think you will need to make a lifting windmill? What is a ratchet? Build a lifting windmill. Build your own mechanism.

**Week 6:** Cams: What are cams? Where can you see the cams in everyday life? What is friction? Build the cam hammer and try to use different cam systems. Run and experiment. Build your own mechanism.

**Week 7:** Lego exploration: Students will have the opportunity to create their own machine using various types of Legos. They will present it to the class and explain how they used different concepts.

## **Rubric**

20% Attendance and Prepared for class

50% Participation (Attention in class, Teamwork, Cleanup)

30% Notes, maintaining notebook